BUILDING BLOCKS

FAST FACTS... FAST FACTS...

IT'S A FACT THAT . . .

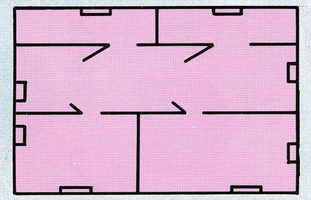
- Our word "architect" comes from the Greek words "arkhi" ("chief") and "tekton" ("builder").
- There are about 130,000 architects in the United States. Of these, 115,000 (88%) are males and 15,000 (12%) are females.
- The first known covered buildings with roofs supported by wooden beams date from 120,000 B.C. in France.
- Bricks are the oldest manufactured building material still being used today.
- Each of the two towers of the World Trade Center in New York City is 110 stories tall (about ¼ mile). Each floor holds one acre of offices. Together the buildings have 43,600 windows to clean.
- In Washington, D.C., no building is allowed to be built taller than the Capitol where Congress meets.

ROLE PLAY
BE AN ARCHITECT – YES, YOU!

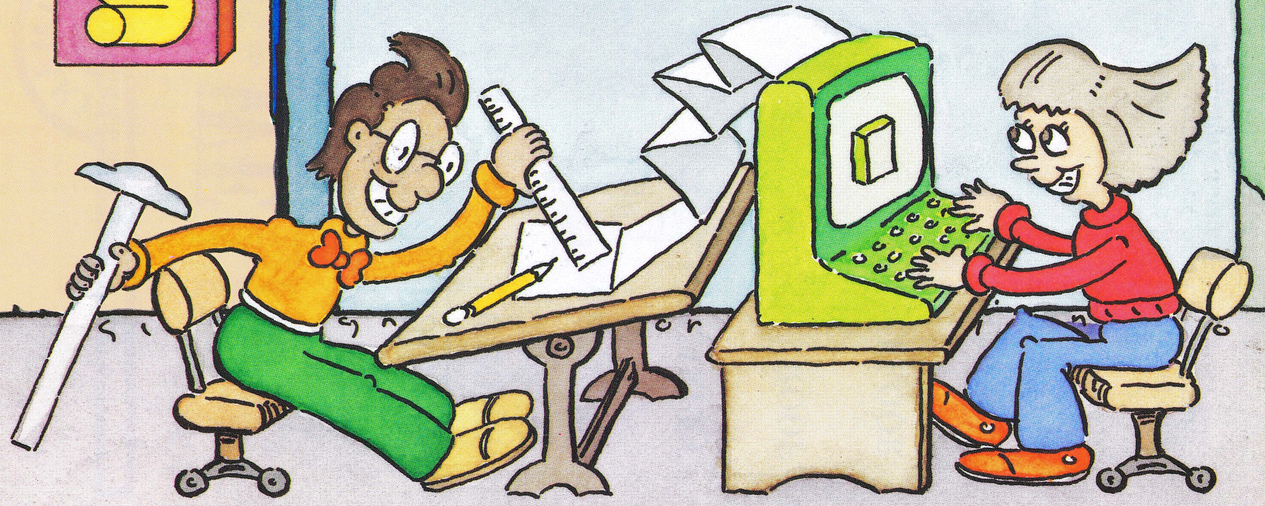
You can use Logo or any computer drawing program to design a building they way modern architects do.

First, choose a familiar building, such as your school. Imagine the building with no roof. What would you see looking down on it from above? Use your computer program to draw this view, which architects call the *floorplan*. (The outside view of a building is called the *elevation*.) Save your floorplan on a disk and print it out. Use a ruler to measure all the lines in the design (such as the walls and doors) and write their measurements alongside them. This paper copy marked with measurements is known as a *blueprint*.

Now call up your floorplan on the computer screen, and change around your school's rooms, doors, walls, and hallways. Save this new floorplan under a new file name, print it out, and use your ruler to add measurements to make a new blueprint. Finally, create a list of all the materials you might need to actually build your new improved school.



This floorplan was created on a computer with Logo.



NEWSLINE
HOW ARCHITECTS USE COMPUTERS

Computers make an architect's work easier and more fun. Before computers, architects drew building plans by hand on paper. They had to work hard to keep their lines straight, and they erased a lot. But now architects can use a keyboard, joystick, mouse, drawing pad, or light-pen to draw perfectly straight lines on a monitor screen. They can erase mistakes just by pushing a button. They can sketch their plans in different colors and easily change them with no mess. Not only that, architects can electronically copy, mirror, move, rotate, and zoom in on any shapes in their drawing. When they're happy with a design, they can print out a copy of it on paper.

But computers in architecture can do a lot more than that. Architects are experimenting with computer aided design (CAD) programs which let them draw solid-looking buildings on the screen. By changing viewpoints, they can "fly" above, around, and even underneath these drawings.

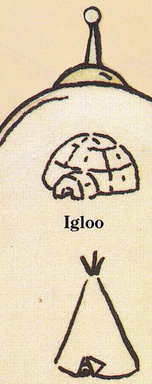
Some computer programs can count how many doors, walls, or windows the building contains. The computer calculates the cost of all the materials, and can even type up an order for them.

Even more amazing, "artificial intelligence" programs can watch over the architect's design to make sure that he or she doesn't make mistakes in measurement or break building code laws. Some advanced programs can even be taught by an architect to design their own buildings.

How do you think computers might be used to design architecture in the future?

RUSSO & SONDER ARCHITECTS, NYC. & SIGN SYSTEMS INC.

Computer assisted design (CAD) programs let architects draw solid-looking buildings on their computer screens.



HISTORY
SHELTER THEN & NOW

The first purpose of architecture was for shelter. Just as animals build nests and dig burrows, people build homes to shelter them from the weather.

All over the world, and in every time, shelters have been built in almost every shape and size with materials found nearby. People have built homes with wood, stone, dry mud, bricks, cement, straw, leaves, metal, cloth, leather, paper, and even aluminum cans.

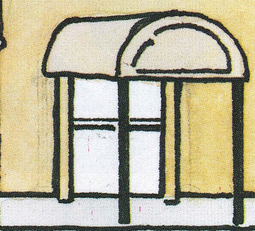
What's your shelter like? Use data base software to create a data file about the home of everyone in your class (see the sample data record below). When everyone has entered his or her shelter data, SORT, SEARCH, and PRINT to find answers to such questions as: What is the most common type of home among students in your class? Who has the most doors? Do most of the wood homes have flat roofs? How many rooms are there in all of your homes combined?

SHELTER DATA RECORD	NUMBER OF WINDOWS: 8
NAME: Frank Lloyd Left	NUMBER OF DOORS: 6
TYPE OF HOME: apartment building	MATERIALS MADE OF: brick, glass, wood, steel
TOTAL NUMBER OF ROOMS: 6	ROOF SHAPE: flat

THIRD • QUIZ • PRECINCT
SPOT-THE-SHAPES

Look closely at the eight different shapes around the border of this poster: square, triangle, circle, semi-circle, cube, cone, sphere, and dome. Architects use these same basic shapes in all their designs. Can you find these shapes in the buildings shown on the poster?

Now use a computer graphics program or Logo to draw a picture of a house, school, or any building using only these shapes. You can use each shape as many times as you like.



Poster copy by
Michael S. Schneider

Teaching and Computers
poster series
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Art by Slug Signorino

COPY

NOTES

WORKSHEET TO COPY AND USE WITH THIS MONTH'S POSTER

TEACHER'S GUIDE

Architecture is everywhere. This poster uses interesting facts and hands-on activities to develop children's awareness of architecture and its principles as well as the growing use of computers in architectural design. The flipside of the poster contains three blackline masters for you to reproduce which reinforce and extend the poster material. (Special note: The Intermediate and Advanced worksheets both require "building materials" which you will need to prepare in advance. See details below).

USING THE POSTER

The poster is divided into five main sections. Here is how to get the most from each.

It's a Fact That . . . Warm up with these architecture facts and such discussion questions as: What does the word "architect" tell about the job? What may be the reasons that there are so many more male architects than female, and can this be expected to change? How many other building materials (besides bricks) can students think of, both natural and humanmade? How many acres of floors are in the two towers of the World Trade Center? (220) How many windows in each building? (21,800). What is the symbolism of the Capitol's height, and what other kinds of buildings involve symbolism?

Shelter Then and Now Assign students to collect information about shelter through history and around the world. Have them draw and label examples of shelters, listing the types of building materials used. Students will then gather and organize information on their own homes in the shelter data base activity. You might have them graph their findings using graphing software such as *Easy Graph II* (Grolier) or *SVE Autograph* (Society for Visual Education).

Spot Those Shapes When students have found all eight shapes (circle, semicircle, square, triangle, sphere, dome, cube, and cone) in the poster buildings, look together for these same shapes in the architecture of your classroom. Discuss why these shapes keep recurring. By drawing buildings using only these few basic shapes, they will begin to understand the strict geometric considerations most architects face — and also the great variety of designs possible through the combination of these shapes.

How Architects Use Computers You may need to discuss such terms as mouse, light-pen, zoom, CAD, artificial intelligence, and building code laws. To demonstrate viewpoint, hold up a solid object and rotate it. Call on students to suggest ways computers might make work easier and more fun for architects in the future.

Be an Architect First explain the difference between an elevation (front and side view of a building) and a floorplan; although students will be working only with floorplans, an architect needs to see both. Encourage students to use all the software's functions (rotate, mirror, and so on) to simulate the architect's CAD tools. Measuring their drawings will help show students the importance of mathematics in architectural design. As an extension, explain "scale modeling" and show students how to convert inches or centimeters in their drawings to feet or meters of actual size.

USING THE WORKSHEETS

This month's worksheets expand upon the concepts presented on the front of the poster.

House-Wear This worksheet helps K-2 children explore the analogy between types of clothing and parts of a house. When they've completed the worksheet, let students draw (by hand or on the computer) more clothing and accessories which are like parts of a building.

To correctly complete the worksheet, your students should draw lines connecting the following pairs: hat/roof; shoe/floor; shirt/wall; socks/carpet; button/doorknob; eyeglasses/windows; pocket/closet. On the Bonus activity, answers will vary.

Extra Strength Set up a separate work area for students to complete this worksheet one at a time. Cut out 26 cardboard or posterboard strips: 18 strips measuring 1"x 8" and eight strips measuring 1" x 12". Punch a hole near each end of each strip. Provide a box of metal brads for connecting the strips.

Students will find that only the triangle is sturdy by itself. All the other shapes lean and collapse until triangles are created within them. Students should summarize this discovery in a short word processing report at the end of the exercise.

Build Your Dream House In this activity, older students will build a three-dimensional architectural model from a floorplan they create on computer with Logo or a graphics program. In advance, collect plenty of foamcore or corrugated cardboard for walls; cut into two-inch wide strips with an razor or knife along the metal straightedge ruler. Provide each student with one 8-1/2" x 11" cardboard base, a ruler, white glue, and crayons or markers. As they complete their drawn floorplans, students will bring their wall measurements for you to cut from the foamcore or cardboard strips. You can cut out doors and windows for them too.

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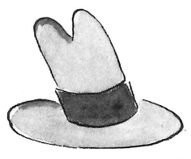
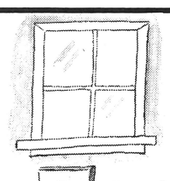
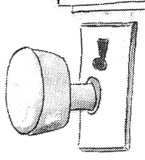
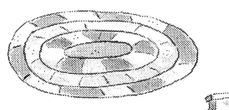
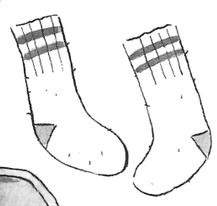
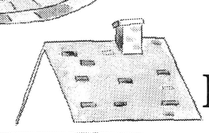
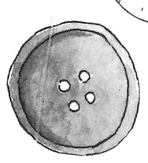
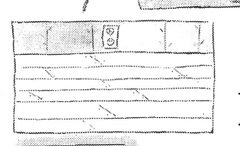
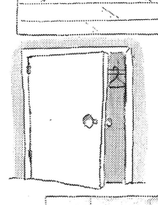
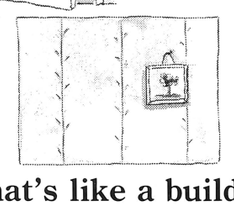
PRIMARY

WORKSHEET TO COPY AND USE WITH THIS MONTH'S POSTER

NAME: _____

HOUSE-WEAR

DIRECTIONS: Your clothes are like parts of a building. Draw a line from each piece of clothing to the part of a building it is like.

CLOTHING		PART OF BUILDING	
HAT			 WINDOW
SHOE			 DOORKNOB
SHIRT			 CARPET
SOCKS			 ROOF
BUTTON			 FLOOR
EYEGLASSES			 CLOSET
POCKET			 WALL

BONUS: What other clothing can you think of that's like a building part? Draw a picture of it on the other side of your paper, or on the computer. Be sure and give your picture a name!

COPY

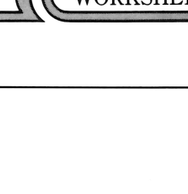
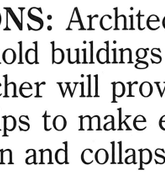
INTERMEDIATE

WORKSHEET TO COPY AND USE WITH THIS MONTH'S POSTER

NAME: _____

EXTRA STRENGTH

DIRECTIONS: Architects use strong materials to build with. They also use strong shapes to hold buildings up. Here's how to find out which shapes hold up the best.
1. Your teacher will provide you with cardboard strips and metal brads. Connect the shorter strips to make each of the shapes below. Which shapes are sturdy? Which shapes lean and collapse? Put a check in the correct box to describe each shape.

		Sturdy	Not sturdy
1			
2			
3			
4			

2. Try adding add one or two long strips to the collapsing shapes to make them sturdy.
3. Now take a guess: What's the sturdiest, strongest shape for architects to use?

On the word processor, write a short report explaining your guess. Give examples of ways that architects use this shape.

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ADVANCED

WORKSHEET TO COPY AND USE WITH THIS MONTH'S POSTER

NAME: _____

BUILD YOUR DREAM HOUSE

DIRECTIONS: Follow these steps to design and build an architectural model of your DREAM HOUSE.

Step 1: Imagine your very own Dream House, and all of the rooms it might have. Then use Logo or a computer graphics program to design a floorplan for this Dream House. (Review "Be An Architect" on the front of the poster if you need help.) Make the floor plan big enough to fill up most of the monitor screen.

Step 2: Print out the floorplan and glue it onto the cardboard base your teacher gives you. Mark clearly where the doors and windows will go.

Step 3: Use the ruler to measure the wall lengths. Write each length on a piece of paper.

RUSSO & SONDER ARCHITECTS, NYC, & SKOK SYSTEMS INC.

Architects at work.

Step 4: Show measurements to your teacher who will cut the walls for you. Your teacher will also cut out the doors and windows in the walls.

Step 5: Use crayons or markers to decorate the inside walls with pictures, curtains, furniture, and anything else you can think of to go inside your Dream House. On the outside walls, draw shutters, bricks, shingles—whatever you like for the outside of your Dream House.

Step 6: Put glue on the bottom edge of each wall. Stand the walls up on top of the cardboard base, over the floorplan lines. Let your model dry overnight.

Step 7: Admire your architectural creation.